THE INFLUENCE OF WORD-LEVEL PROSODIC STRUCTURE OF THE MOTHER TONGUE ON PRODUCTION OF WORD STRESS IN DUTCH AS A SECOND LANGUAGE

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ABSTRACT

The central question in the current research is whether the prosodic structure of the first language (L1) influences production of word stress in Dutch as a second language (DSL). In Dutch the position of word stress can be predicted on the basis of phonological and morphological rules, but there are many exceptions to these rules. In the current investigation existing Dutch words were used, varying the predictability of the stress position systematically. As L1s French, Mandarin Chinese, Polish and Hungarian were selected. For each L1 five intermediate DSL-speakers were asked to read aloud a set of stimulus materials. Results reveal that the non-native speakers do make word stress errors, but transfer of the L1 prosodic system does not seem to be the main cause. Instead overgeneralization of stress rules provides a better explanation of the errors, pointing to spontaneous acquisition of the Dutch word stress systematics.

Keywords: second language acquisition, speech prosody, word stress, transfer

1. INTRODUCTION

What exactly is non-native pronunciation? What is the precise role of the mother tongue (L1) in pronunciation of Dutch as a second language? Answers to these questions are relevant to second language pedagogy, but they are also relevant to the theory of second language acquisition. Does the transfer hypothesis – L1 influences acquisition of L2 – [15] explain all non-native aspects of pronunciation, including stress placement errors? Or is each word simply acquired with its correct stress position? Is there any evidence for acquisition of stress rules? Note that word stress does not play a substantial role in teaching materials for Dutch as a second language, in spite of the fact that there is evidence that adequate prosody is of importance to the intelligibility of L2-speakers (c.f. [2, 10, 11, 14, 17]).

2. BACKGROUND

The question of influence of the mother tongue on production of word stress in a second language has been extensively investigated in recent literature on second language acquisition, psycholinguistics and phonology.

Archibald [3, 4, 5] investigated production of word stress within the generative framework of metrical phonology. The L2 under investigation was English and the subjects were adult speakers of Hungarian, Polish and Spanish. Archibald's broad conclusion was that "adult interlanguages do not violate metrical universals and [...] adults are capable of resetting their parameters to the L2 setting" [5] p. 177. However, transfer was observed in the results of Hungarian ESL-speakers as opposed to Polish ESL-speakers [3].

A cross-linguistic study into production of word stress in Polish as a second language [12] revealed that the structure of L1 influences L2 word stress production. Native speakers of eight typologically different languages (Russian, Czech, German, French, English, Spanish, Italian and Chinese) read aloud Polish nonsense words (of three and four syllables). Results showed that speakers of L1s whose stress position is the same as in the L2 have an initial advantage over those whose L1 does not allow that L2 stress position. Moreover, the non-L2 stress patterns could be mainly accounted for by transfer of L1 stress properties.

In [1] the production of word stress in English as a second language was investigated. Again stimuli consisted of nonsense words and were read aloud by native speakers of Spanish, Arabic, French, Turkish, Chinese, Japanese and Korean. The results suggest that the presence of a predictable stress position in L1 facilitates correct stress production in L2.

Summarizing, there is evidence for transfer of L1 prosodic structure as well as some influence of the syllable structure of L2 [12].

3. RESEARCH QUESTION AND APPROACH

What is the relation between the production of word stress in Dutch as L2 and the prosodic structure of the L1 of the speaker? Does a language with a fixed stress position have more influence on correct production of word stress in L2 Dutch than a language without prominence at the word level? To answer these questions native speakers of four typologically different languages were asked to read aloud existing Dutch words. In most experimental studies on word stress the stimulus materials typically consist of nonsense words (cf. [1, 12]), under the assumption that testing the production of real words does not reveal phonological processes, since the stress position could be lexically stored. We argue however that this assumption may not be correct, and since speaking Dutch simply requires pronouncing existing words, this type of word was used in current experiment. The stimulus words varied in terms of their length, morphological complexity and regularity of the word stress position.

The L1s of the subjects encompassed different types of prosodic structure. Hungarian is a language with fixed stress on the first syllable [16]; in Polish the stress almost always falls on the penultimate syllable [9, 18]; French stands out for its prominence at the phrase level – the last syllable of a content word coupled with the surrounding function words is the most prominent one [6]; Chinese is a tone language and stressed syllables do not exist in this language [13].

It was expected that (1) transfer of the L1 stress position would occur. For the Hungarian DSL-speakers it meant that they were expected to be inclined to stress the first syllable of Dutch words; the Polish speakers should give preference to the penultimate and the French to the last syllable. There were no direct predictions for the Chinese speakers in terms of the transfer hypothesis.

Moreover, we concentrated our attention on the question whether the regularity of the word stress position plays a role in DSL stress placement. It was expected that (2) stimuli with regular (predictable) stress positions would be produced with correct stress more often than words with irregular stress positions. Additionally, we expected some overgeneralizations in words with irregular stress positions.

4. METHOD

4.1. Stimulus materials

The stimuli used in the experiment were Dutch real words that varied in terms of their length (two, three or four syllables), morphological complexity (free or complex) and regularity of the word stress position (regular or irregular). The stimuli were classified as regular or irregular according to the following simple rules: (a) no stress on schwa; (b) free words have a trochaic stress pattern or stress on the final syllable if heavy; (c) in compounds stress falls on the first part, in derivatives on the basic word [8].

4.2. Subjects

Twenty DSL-speakers took part in the experiment. The group consisted of highly-educated native speakers of Hungarian (N = 5), Polish (N = 5), French (N = 5) and Mandarin Chinese (N = 5). They were all intermediate speakers of Dutch as a second language (approx. CEF level A2-B1). All speakers had acquired at least one other foreign language, i.e., English. There was a control group consisting of five native speakers of Dutch.

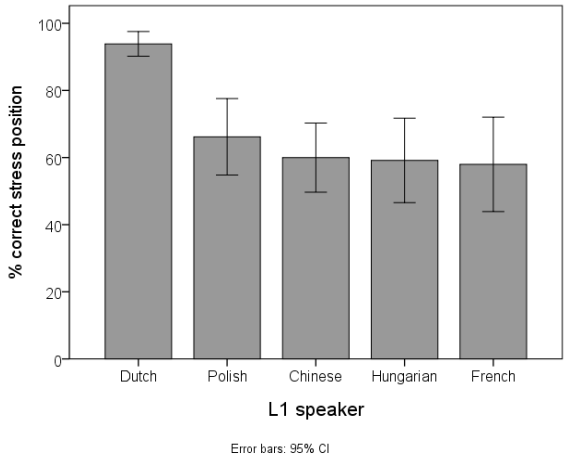
4.3. Procedure and analysis

Part of the stimulus words (N = 64) were embedded in a coherent text, the remainder of the test words (N = 52) were presented in a list. The recordings took place in a sound-proof cabin and were made with Adobe Audition software. After the recording of the stimulus materials all non-native subjects were asked to mark the unknown words in an alphabetical list of stimulus words. To establish the word stress positions realized by the subjects, three native Dutch speakers independently marked the syllables perceived as stressed, using Praat [7]. The agreement between the raters was high (κ = .845, .855 and .839).

5. RESULTS

Figure 1 presents the percentage of correctly stressed stimulus words for the five different groups of subjects separately. Inspection of the figure reveals that the native speakers made only a few stress position errors (5%, mistakes scattered over 23 different stimulus words). The differences between the four groups of non-native speakers are rather small: roughly a third of the L2 words are incorrectly stressed.

Figure 1: Percentage of correctly placed stress, broken down by L1 of the speaker.

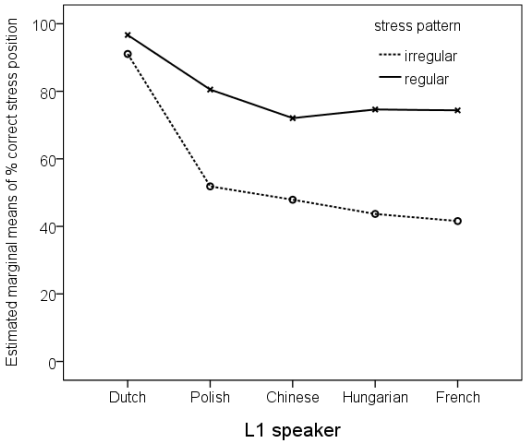


A oneway analysis of variance on the aggregated data (pooling over words for each participant, but broken down by regularity of the word stress position) reveals a significant effect of L1 ($F_{4,49} = 9.648$, $p < .001$). This effect is caused entirely by the difference between the native and non-native speakers: a posthoc analysis shows no significant difference among the four groups of non-native speakers (Bonferroni).

A repeated measures analysis on the percentage of correct stress positions with type of L1 as the between-subjects factor and regularity of the stress position as within-subjects factor shows main effects of regularity ($F_{1,20} = 185.041$, $p < .001$) and a significant interaction between L1 and regularity ($F_{4,20} = 7.504$, $p < .005$). Again, the effects are totally due to the difference between native and non-native speakers, see figure 2. For all groups of non-native speakers the words with regular stress patterns are produced with correct stress much more often than the words that have an unpredictable stress position.

No significant effects were found for the factor L1 in oneway analyses of variance on the percentages of initial, prefinal and final stress positions produced by the DSL-speakers (respectively: $F_{3,39} = 2{,}342$, ins.; $F_{3,39} = 1{,}293$, ins.; $F_{3,39} < 1$, ins.). This means that the expected preference for a word stress position that matches the word prosodic characteristics of the L1 – the first syllable when L1 is Hungarian, the prefinal syllable when L1 is Polish, and the final syllable in case of French – cannot be found in the data. These results do not corroborate the transfer hypothesis (1).

Figure 2: Percentage of correctly placed stress for the different types of L1, broken down by regular versus irregular stress patterns.



There are far less mistakes made in words with a regular word stress position than in words with irregular stress. A further analysis of the incorrect stress positions produced on words with irregular stress patterns reveals that the majority of the errors can be interpreted as overgeneralization of the stress rules (cf. section 4.1.). The data (see Table 1) suggest that the DSL-speakers with Hungarian, Polish, Chinese and French as L1 all apply the Dutch stress systematics to approximately the same extent. These results support our expectations formulated in hypothesis (2).

Table 1: Absolute (and relative) frequency of correct stress on regular words (total N = 390) and regular stress on irregular words (total N = 190), broken down by L1.

L1 speaker	correct regular stress	over-generalization	total of rule-based stress
Hungarian	291 (75%)	75 (39%)	366 (63%)
Polish	314 (81%)	69 (36%)	383 (66%)
French	290 (74%)	91 (48%)	381 (66%)
Chinese	281 (72%)	81 (43%)	362 (62%)
total	1176 (75%)	316 (42%)	1492 (64%)

No influence of the knowledge of the stimulus words has been found (see Table 2). Although the Chinese participants marked 31% of the words as unknown and the French, Polish and Hungarian only 9%, 5% and 8%, respectively, all groups made approximately the same number of mistakes (see Figure 1). This indicates that knowledge of the words (i.e., storage in the mental lexicon) is not very relevant to the production of correct word stress in Dutch as a second language.

Table 2: Absolute (and relative) frequency of known and unknown words, broken down by L1.

L1 speaker	unknown words	known words	total
Hungarian	49 (8%)	531 (92%)	580
Polish	29 (5%)	551 (95%)	580
French	55 (9%)	525 (91%)	580
Chinese	179 (31%)	401 (69%)	580
total	312 (13%)	2008 (87%)	2320

6. CONCLUSION AND DISCUSSION

The main expectation that the DSL-speakers would be influenced by the prosodic structure of their L1s in production of word stress in Dutch was not confirmed by the results of the production experiment. This does not mean that the DSL-speakers did not make stress errors, but the incorrect placement of word stress can be mainly accounted for by overgeneralization of stress rules. The effect of regularity of the stress position plays a significant role in the data of all groups of non-native speakers.

The similarities between the results of the different groups of DSL-speakers strongly outweigh the differences. It seems that all groups have successfully acquired the basic principles of the Dutch word stress system, despite the fact that word stress is generally not explicitly taught (teaching materials for Dutch as a second language virtually ignore stress). These results allow the conclusion that DSL-speakers acquire the rules spontaneously. Apparently, they are able to extract regularities from the language input and subsequently use them in production.

The fact that no transfer of L1 prosodic structure could be found in the present data seems to contradict earlier findings in this field (cf. section 2.). This could probably be explained by the specific L2 that was investigated (Dutch, not English or Polish), and/or by the fact that existing words were used instead of nonsense words.

Since the results show no clear effect of knowledge of the stimulus words, the exclusive use of nonsense words in this type of research seems questionable.

Further research on word stress production is needed in order to provide more information about the acquisition of Dutch prosody. Ideally, more speakers (in homogeneous groups, including less advanced learners) and speakers of other L1s than here represented, should take part in different types of experiments for the picture of the word stress acquisition process to become more complete.

7. REFERENCES

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